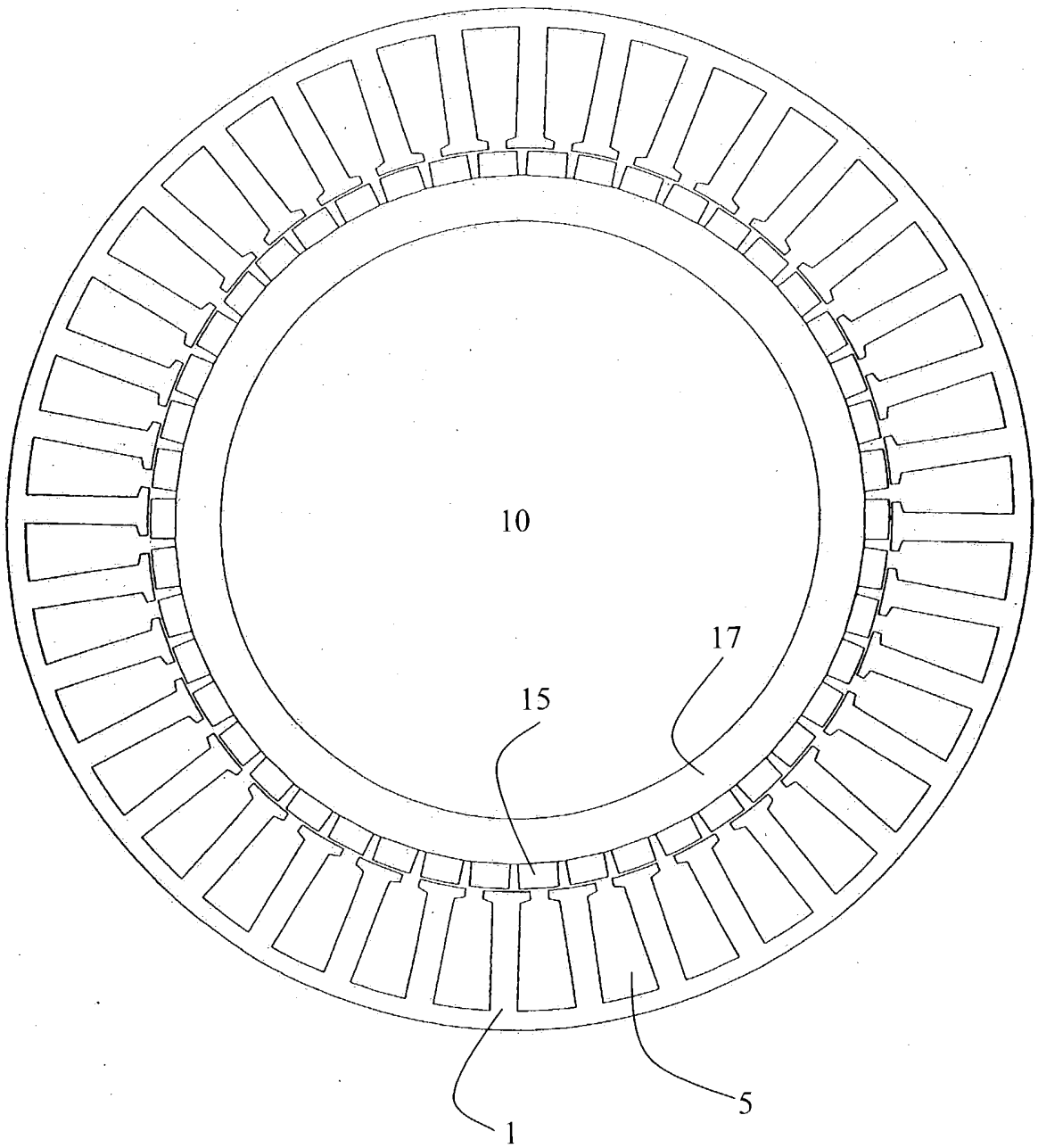

FIG. 1

Slot – Pole Combination Comparison chart for C il span of 1 Tooth

Poles	Slots	Slot/Pole Ratio	Balanced Winding All Slots Filled	Balanced Winding	Ct	Maximum Parallel Paths	Kp	THD – Total Harmonic Distortion
30	18	0.6	0	2	6	6	0.5	0.249604232
30	19	0.633333333	1	2	1	6	0.614212713	0.190971274
30	20	0.666666667	2	2	10	6	0.707106781	0.249604232
30	27	0.9	0	1	3	3	0.984807753	0.166114912
30	28	0.933333333	1	1	2	3	0.99371221	0.180495453
30	29	0.966666667	2	1	1	3	0.998533414	0.220396749
32	18	0.5625	0	1	2	2	0.342020143	0.657104652
32	19	0.59375	1	1	1	2	0.475947393	0.323691168
32	20	0.625	2	1	4	2	0.587785252	0.201330169
32	21	0.65625	0	2	1	1	0.680172738	0.232832619
32	22	0.6875	1	2	2	1	0.755749574	0.276438918
32	23	0.71875	2	2	1	1	0.816969893	0.269499191
32	24	0.75	0	1	8	8	0.866025404	0.249604232
32	25	0.78125	1	1	1	8	0.904827052	0.157858999
32	26	0.8125	2	1	2	8	0.935016243	0.11528497
32	27	0.84375	0	2	1	1	0.957989512	0.13131874
32	28	0.875	1	2	4	1	0.974927912	0.149341528
32	29	0.90625	2	2	1	1	0.986826523	0.169308324
32	30	0.9375	0	1	2	2	0.994521895	0.183418691
32	31	0.96875	1	1	1	2	0.998716507	0.223457681
34	18	0.529411765	0	2	2	2	0.173648178	1.085649275
34	19	0.558823529	1	2	1	2	0.324699469	0.686198554
34	20	0.588235294	2	2	2	2	0.4539905	0.397073845
34	21	0.617647059	0	1	1	1	0.563320058	0.203411399
34	22	0.647058824	1	1	2	1	0.654860734	0.208570119
34	23	0.676470588	2	1	1	1	0.730835964	0.261882278
34	24	0.705882353	0	2	2	2	0.79335334	0.277721125
34	25	0.735294118	1	2	1	2	0.844327926	0.267057827
34	26	0.764705882	2	2	2	2	0.885456026	0.208454625
34	27	0.794117647	0	1	1	1	0.918216107	0.13082749
34	28	0.823529412	1	1	2	1	0.94388333	0.117555714
34	29	0.852941176	2	1	1	1	0.963549993	0.136965075
34	30	0.882352941	0	2	2	2	0.978147601	0.154326845
34	31	0.911764706	1	2	1	2	0.988468324	0.171590662
34	32	0.941176471	2	2	2	2	0.995184727	0.186570007
34	33	0.970588235	0	1	1	1	0.998867339	0.226097856

Figure 2A

Slot – Pole Combination Comparision chart for Coil span of 1 Tooth

Poles	Slots	Slot/Pole Ratio	Balanced Winding All Slots Filled	Balanced Winding	Ct	Maximum Parallel Paths	Kp	THD – Total Harmonic Distortion
36	27	0.75	0	1	9	9	0.866025404	0.249604232
36	28	0.777777778	1	1	4	9	0.900968868	0.167391628
36	29	0.805555556	2	1	1	9	0.92897672	0.118069217
38	21	0.552631579	0	2	1	1	0.294755174	0.736875711
38	22	0.578947368	1	2	2	1	0.415415013	0.507438062
38	23	0.605263158	2	2	1	1	0.51958395	0.21104203
38	24	0.631578947	0	1	2	2	0.608761429	0.192667
38	25	0.657894737	1	1	1	2	0.684547106	0.236262364
38	26	0.684210526	2	1	2	2	0.748510748	0.272550678
38	27	0.710526316	0	2	1	1	0.802123193	0.274221271
38	28	0.736842105	1	2	2	1	0.846724199	0.26638671
38	29	0.763157895	2	2	1	1	0.883512044	0.213427941
38	30	0.789473684	0	1	2	2	0.913545458	0.139013604
38	31	0.815789474	1	1	1	2	0.937752132	0.115188724
38	32	0.842105263	2	1	2	2	0.956940336	0.130194434
38	33	0.868421053	0	2	1	1	0.971811568	0.145338011
38	34	0.894736842	1	2	2	1	0.9829731	0.162913532
38	35	0.921052632	2	2	1	1	0.990949762	0.174843151
38	36	0.947368421	0	1	2	2	0.996194698	0.193131583
38	37	0.973684211	1	1	1	2	0.999098966	0.230367049
40	21	0.525	0	1	1	1	0.149042266	1.225362448
40	22	0.55	1	1	2	1	0.281732557	0.761620727
40	23	0.575	2	1	1	1	0.39840109	0.547282825
40	24	0.6	0	2	8	8	0.5	0.249604232
40	25	0.625	1	2	5	8	0.587785252	0.201330169
40	26	0.65	2	2	2	8	0.663122658	0.216878644
40	27	0.675	0	1	1	1	0.727373642	0.259900638
40	28	0.7	1	1	4	1	0.781831482	0.281021751
40	29	0.725	2	1	1	1	0.827688998	0.268317086
40	30	0.75	0	1	10	10	0.866025404	0.249604232
40	31	0.775	1	1	1	10	0.89780454	0.175587301
40	32	0.8	2	1	8	10	0.923879533	0.122971276
40	33	0.825	0	1	1	1	0.945000819	0.118332187
40	34	0.85	1	1	2	1	0.961825643	0.135272043
40	35	0.875	2	1	5	1	0.974927912	0.149341528
40	36	0.9	0	1	4	4	0.984807753	0.166114912
40	37	0.925	1	1	1	4	0.991900435	0.176320946
40	38	0.95	2	1	2	4	0.996584493	0.196366609
40	39	0.975	0	1	1	1	0.999188998	0.232098334

Figure 2B

Slot – Pole Combination Comparision chart for Coil span of 1 Tooth

Poles	Slots	Slot/Pole Ratio	Balanced Winding All Slots Filled	Balanced Winding	Ct	Maximum Parallel Paths	Kp	THD – Total Harmonic Distortion
42	27	0.642857143	0	2	3	3	0.64278761	0.197900559
42	28	0.666666667	1	2	14	3	0.707106781	0.249604232
42	29	0.69047619	2	2	1	3	0.762162055	0.279151695
42	36	0.857142857	0	1	6	6	0.965925826	0.139252172
42	37	0.880952381	1	1	1	6	0.977555239	0.15334635
42	38	0.904761905	2	1	2	6	0.986361303	0.16861041
44	24	0.545454545	0	2	4	4	0.258819045	0.812389602
44	25	0.568181818	1	2	1	4	0.368124553	0.609641573
44	26	0.590909091	2	2	2	4	0.464723172	0.361566081
44	27	0.613636364	0	2	1	1	0.549508978	0.200401777
44	28	0.636363636	1	2	4	1	0.623489802	0.189969977
44	29	0.659090909	2	2	1	1	0.687699459	0.238535408
44	30	0.681818182	0	1	2	2	0.743144825	0.269343888
44	31	0.704545455	1	1	1	2	0.790775737	0.278653118
44	32	0.727272727	2	1	4	2	0.831469612	0.268212778
44	33	0.75	0	1	11	11	0.866025404	0.249604232
44	34	0.772727273	1	1	2	11	0.895163291	0.182599153
44	35	0.795454545	2	1	1	11	0.919527773	0.12879784
44	36	0.818181818	0	2	4	4	0.939692621	0.115564239
44	37	0.840909091	1	2	1	4	0.956166735	0.129357338
44	38	0.863636364	2	2	2	4	0.969400266	0.142690529
44	39	0.886363636	0	2	1	1	0.979790652	0.157167442
44	40	0.909090909	1	2	4	1	0.987688341	0.170539182
44	41	0.931818182	2	2	1	1	0.99340209	0.179588252
44	42	0.954545455	0	1	2	2	0.997203797	0.202472832
44	43	0.977272727	1	1	1	2	0.999332848	0.234949902

Figure 2C

Slot – Pole Combination Comparision chart for Coil span of 1 Tooth

Poles	Slots	Slot/Pole Ratio	Balanced Winding All Slots Filled	Balanced Winding	Ct	Maximum Parallel Paths	Kp	THD – Total Harmonic Distortion
46	24	0.52173913	0	2	2	2	0.130526192	1.37050075
46	25	0.543478261	1	2	1	2	0.248689887	0.8379287
46	26	0.565217391	2	2	2	2	0.354604887	0.634871592
46	27	0.586956522	0	1	1	1	0.44879918	0.413656044
46	28	0.608695652	1	1	2	1	0.532032077	0.200919998
46	29	0.630434783	2	1	1	1	0.605174215	0.194073445
46	30	0.652173913	0	2	2	2	0.669130606	0.222860679
46	31	0.673913043	1	2	1	2	0.724792787	0.258475468
46	32	0.695652174	2	2	2	2	0.773010453	0.281489772
46	33	0.717391304	0	1	1	1	0.814575952	0.270030285
46	34	0.739130435	1	1	2	1	0.850217136	0.264969061
46	35	0.760869565	2	1	1	1	0.880595532	0.220629124
46	36	0.782608696	0	2	2	2	0.906307787	0.154370684
46	37	0.804347826	1	2	1	2	0.927889027	0.118929404
46	38	0.826086957	2	2	2	2	0.945817242	0.118956414
46	39	0.847826087	0	1	1	1	0.960518112	0.133955165
46	40	0.869565217	1	1	2	1	0.97236992	0.146000776
46	41	0.891304348	2	1	1	1	0.98170832	0.160624769
46	42	0.913043478	0	2	2	2	0.988830826	0.172063705
46	43	0.934782609	1	2	1	2	0.994000975	0.181438187
46	44	0.956521739	2	2	2	2	0.997452115	0.205290332
46	45	0.97826087	0	1	1	1	0.999390827	0.236129319
48	27	0.5625	0	1	3	3	0.342020143	0.657104652
48	28	0.583333333	1	1	4	3	0.433883739	0.458394586
48	29	0.604166667	2	1	1	3	0.515553857	0.216725294
48	36	0.75	0	1	12	12	0.866025404	0.249604232
48	37	0.770833333	1	1	1	12	0.892925858	0.188602834
48	38	0.791666667	2	1	2	12	0.915773327	0.134926839
48	45	0.9375	0	1	3	3	0.994521895	0.183418691

Figure 2D

	Ct Value	Cogging - Ideal Magnet Location and Ideal Form of Parts	One Magnet Pole shifted .005" into the airgap	One Magnet shifted .005" into the airgap	Magnet OD ground .007" per side	Magnet OD ground .007"
Slot/Pole Combination		% Pk-pk of Motors Tc	% Pk-pk of Motors Tc	Normalized to Ideal	% Pk-pk of Motors Tc	Normalized to Ideal
36/46	2	0.36	0.57	1.59	< .36	< 1.0
30/40	10	.66	1.24	1.90	6.11	9.26

FIG. 3